REMARKS

This application has been carefully reviewed in light of the Office Action dated September 24, 2007. Claims 1-19 remain in this application. Claims 1, 12, 18 and 19 are the independent Claims. Claims 1-5, 8-9, 12-14, 16 and 17 have been amended. Claims 18 and 19 are the New Claims. It is believed that no new matter is involved in the amendments or arguments presented herein. Reconsideration and entrance of the amendment in the application are respectfully requested.

Art-Based Rejections

Claims 1-17 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,739,796 (Jasper); Claims 1 6 and 8 17 were rejected under § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) over U.S. P.G. Pub. 2002/0146196 (Shirane). Applicant respectfully traverses the rejections and submits that the claims herein are patentable in light of the clarifying amendments above and the arguments below.

The Jasper Reference

U.S. Patent No. 5,739,766 ("Jasper") discloses a two-dimensional photonic band gap crystal where a plurality of N equal length dielectric rods with a square cross-sectional dimension are aligned with constant spacing into first, second, and third rows that are parallel to each other. According to Jasper, a crystal 15 formed with a first sub-crystal 10 and a second sub-crystal stacked in parallel with the first sub-crystal 10 produces a photonic band gap for TE waves and a smaller band gap for TM waves (*See, Jasper, col. 6, lines 63-67*) (*See, Jasper, Fig. 3*)

The Shirane Reference

Shirane teaches cylinder-shaped i-type semiconductors that are aligned in a two-dimensional triangular lattice. (*See, Shirane, [0048].*)

The Claims are Patentable Over the Cited References

The present application is generally directed to two-dimensional photonic crystal.

Claim 1

As defined by amended independent Claim 1, a two-dimensional photonic crystal has a plane in which four adjoining unit lattices are arranged so as to have one angle in common with the unit lattice being a rectangle whose shorter side X1 has a length of x1 and whose longer side Y1 has a length of y1. First dielectric regions each being columnar and having a rectangular cross section whose short side X2 has a length of x2 and whose longer side Y2 has a length of y2 are disposed on the shorter sides X1 and the longer sides Y1 of each rectangular unit lattice. The first dielectric region is arranged so that the midpoint of the shorter side X1 and the midpoint of the longer side Y1 and the center of the rectangular cross section substantially coincide and are not arranged at the corners of the rectangular unit lattice where shorter side X1 and longer side Y1 intersect. The longer sides Y2 of each first dielectric region are substantially parallel to each other. The first dielectric region is arranged so that the longer side Y2 of the rectangular cross section is substantially parallel to the longer side Y1 of the unit lattice. The ratio of x1:y1 equals 1:substantially $\sqrt{3}$. The ratio of x1:x2:y2 equals 1:0.133:0.48 to 1:0.158:0.58. The two-dimensional photonic crystal has a full band gap width of 20% or greater.

The applied references do not disclose or suggest the features of the present invention as defined by amended independent Claim 1. In particular, the applied references do not disclose or suggest, "said two dimensional-photonic crystal has a full band gap width of 20.0% or greater," as required by amended independent Claim 1.

The applied Jasper reference discloses a crystal 15 formed with a first sub-crystal 10 and a second sub-crystal stacked in parallel with the first sub-crystal 10 produces a photonic band gap for TE waves and a smaller band gap for TM waves (*See, Jasper, col. 6, lines 63-67*).

FIG. 3 of Jasper shows the crystal 15 and the first sub-crystal 10. However, it does not show the second sub-crystal that forms the crystal 15 with the first sub-crystal 10. The second sub-crystal has a second constant square cross-sectional dimension, W/2, half the square cross-sectional dimension, W, of the first sub-crystal 10, and a second constant inter-rod spacing, d/2, also half the constant inter-rod spacing, d, of the first sub-crystal 10 (column 6, lines 45-51, and claim 2). The crystal 15 would rather look much more like what is shown in FIG. 10 with the rods having square cross-sectional dimension.

In other words, Jasper's crystal capable of producing band gaps for TE waves and TM waves is formed with two sub-crystals having different cross-sectional dimension and different constant inter-rod spacing. Hence, Jasper neither discloses a crystal formed with dielectrics arranged in a single period as disclosed in the present invention nor that such a crystal with dielectrics arranged in a single period can produce a full band gap.

Therefore, Jasper does not disclose or suggest this feature of the present invention as required by independent Claim 1.

Shirane does not remedy deficiencies in Jasper.

Since the cited references fail to disclose, teach or suggest the above features recited in amended independent Claim 1, those references cannot be said to anticipate nor render obvious the invention which is the subject matter of that claim.

Accordingly, amended independent Claim 1 is believed to be in condition for allowance and such allowance is respectfully requested.

Applicant respectfully submits that independent Claim 12 is allowable for at least the reasons discussed in connection with amended independent Claim 1, and such allowance is respectfully requested.

Claim 18

As defined by independent Claim 18, a two-dimensional photonic crystal has a plane in which four adjoining unit lattices are arranged so as to have one angle in common with the unit lattice being a rectangle whose shorter side X1 has a length of x1 and whose longer side Y1 has a length of y1. First dielectric regions each being columnar and having a rectangular cross section whose short side X2 has a length of x2 and whose longer side Y2 has a length of y2 are disposed on the shorter sides X1 and the longer sides Y1 of each rectangular unit lattice. The first dielectric region is arranged so that the midpoint of the shorter side X1 and the midpoint of the longer side Y1 and the center of the rectangular cross section substantially coincide and are not arranged at the corners of the rectangular unit lattice where shorter side X1 and longer side Y1 intersect. The longer sides Y2 of each first dielectric region are substantially parallel to each other. The first dielectric region is arranged so that the longer side Y2 of the rectangular cross section is substantially

parallel to the longer side Y1 of the unit lattice. The ratio of x1:y1 equals 1:substantially $\sqrt{3}$. The ratio of x1:x2:y2 equals 1:0.133:0.48 to 1:0.158:0.58. The photonic crystal includes a second dielectric region surrounding the first dielectric region and having a dielectric constant different from that of the first dielectric region. One of the first dielectric region and the second dielectric regions is formed from a dielectric material and the other is formed from a gas. The dielectric material is a $BaO\text{-}TiO_2$ based dielectric material or $BaO\text{-}Nd_2O_3\text{-}TiO_2$ based dielectric material.

The applied references do not disclose or suggest the features of the present invention as defined by independent Claim 18. In particular, the applied references do not disclose or suggest, "said dielectric material is a $BaO\text{-}TiO_2$ based dielectric material or $BaO\text{-}Nd_2O_3\text{-}TiO_2$ based dielectric material," as required by independent Claim 18.

Jasper fails to teach, disclose or even suggest a $BaO\text{-}Nd_2O_3\text{-}TiO_2$ based dielectric material. Moreover, Shirane does not disclose any of dielectric materials that are recited in independent claim 18.

Since the cited references fail to disclose, teach or suggest the above features recited in independent Claim 18, those references cannot be said to anticipate nor render obvious the invention which is the subject matter of that claim.

Accordingly, independent Claim 18 is in condition for allowance and such allowance is respectfully requested.

Applicant respectfully submits that independent claim 19 is allowable for at least the reason discussed in connection with independent claim 18, and such allowance is respectfully requested.

The remaining claims depend either directly or indirectly from independent Claims 1, 12, 18 and 19, and recite additional features of the invention which are neither disclosed nor fairly suggested by the applied references and are therefore also believed to be in condition for allowance.

Conclusion

Applicant believes the foregoing amendments comply with requirements of form and thus may be admitted under 37 C.F.R. § 1.116(b). Alternatively, if these amendments are deemed to touch the merits, admission is requested under 37 C.F.R. § 1.116(c). In this connection, these amendments were not earlier presented because they are in response to the matters pointed out for the first time in the Final Office Action.

Lastly, admission is requested under 37 C.F.R. § 1.116(b) as presenting rejected claims in better form for consideration on appeal.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (310) 785-4721 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

Date: December 20, 2007

By: 
Dariush G. Adli
Registration No. 51,386
Attorney for Applicant(s)

1999 Avenue of the Stars, Suite 1400
Los Angeles, California 90067
Phone: 310-785-4600
Fax: 310-785-4601